



EFFECT OF CONSTRUCTIVIST APPROACH ON ACADEMIC ACHIEVEMENT IN RELATION TO INTELLIGENCE OF ELEMENTARY SCHOOL STUDENTS IN BIOLOGY

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ABSTRACT

In the present study the effect of Constructivist Approach on Academic Achievement in relation to Intelligence of Elementary School Students in Biology was investigated. Pre test – Post test control group experimental design was followed. Sample of 120 students was picked up for the study comprising of two groups of 60 students each viz. control and experimental group. The study shows that constructivist teaching approach exhibit significant higher level of academic achievement and also exhibit significant interaction between the Teaching Techniques and Intelligence on Academic Achievement in biology. The results revealed that Constructivism plays a central role to increase the academic achievement and also acquisition of the concepts of biology.

KEYWORDS: Constructivist, Intelligence, Academic Achievement, Teaching Techniques and Acquisition of Concepts.

Introduction:

Constructivism is an epistemological view of knowledge acquisition emphasizing knowledge construction rather than knowledge transmission and the recording of information conveyed by others. It says that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. Constructivist Approach is an approach which makes use of tenets of constructivism in the process of teaching and learning. Constructivist approach is one strategy that can enable all the learners to construct valid knowledge and also enable them to transmit it in different contexts. It usually means encouraging students to use active techniques (experiments, real-world problem solving) to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing.

Need of the Study:

Learning no longer remains confined to the dry and dreary domains of abstract knowledge. These days, in the process of education, application of knowledge to daily life situations is the buzz word. In a vast country like India, teachers by and large are unable to adopt appropriate methods for teaching which in turn retard students learning. Therefore, there is a need on the development and effectiveness of latest teaching techniques. Contents and concepts of biology in our school curriculum have remained the same for last many years. In constructivist biology teaching, students were directly involved in their own learning and more hands on activities that involved the use of manipulative. Constructivist view of teaching believed that if a child is given proper time and guidance, then he will be able to formulate answers on his own. Constructivist teaching approach in the classrooms for teaching biology nurtured curiosity and creativity of students in biology.

Objectives:

1. To study the effect of constructivist teaching approach on academic achievement of elementary school students in biology.
2. To study the effect of constructivist teaching approach on biology as compared to traditional method of teaching in relation to intelligence.

Hypotheses:

1. There is a significant difference in the efficacy of constructivist teaching approach as compared to traditional method of teaching on academic achievement of elementary school students in biology.
2. There is a significant interaction between teaching techniques and intelligence on academic achievement of elementary school students in biology.

Sample:

120 students via purposive sampling were selected. Out of these 100 students, 60 students of government elementary school, Kauli were treated as experimental group and given treatment according to the lesson plans prepared by using constructivist teaching approach and 60 students of government elementary school, Daun Kalan which were treated as control group, given treatment using traditional method of teaching.

Design:

In the present study pre-test, post-test randomized matched subject experimental-control group design was employed.

Tools:

1. Criterion Test in Biology for the assessment of Academic Achievement in Biology.
2. Raven's Standard Progressive Matrices.
3. Modules for Implementing Constructivist Teaching Approach in Biology.

Procedure:

The data was collected in three phases:

Phase I: Pre-Experimental Stage: The criterion test in biology prepared by the investigator and raven's standard progressive matrices were administered and after scoring the test booklets, the pre-test measure in terms of initial knowledge possessed by the students in biology and their levels of intelligence were obtained. Pre-testing was done simultaneously for both of the experiment and control group students.

Phase II: Experimental Stage: In the experimental stage, the experimental group was taught using the teaching modules prepared in accordance to the constructivist teaching approach and the control group was given treatment as per the lesson plans prepared by using traditional method of teaching. The teaching session for both the experimental and control group was 50 working days.

Phase III: Post-Experimental Stage: This was the stage in which criterion test in biology was re-administered on both experimental and control groups immediately after the treatment was over in order to measure the achievement of the students in biology.

Statistical Analysis:

The data collected was analyzed by employing elementary statistical computations namely mean, standard deviation, t-test, ANCOVA.

Results:

H1: There is a significant difference in the efficacy of constructivist teaching approach as compared to traditional method of teaching on academic achievement of elementary school students in biology.

Table 1: Mean Scores and Standard Deviation of Academic Achievement (Pre-Test and Post-Test)

| Type of Group (N=120) | Pre Test | | Post test | |
|---------------------------|----------|------|-----------|-------|
| | Mean | SD | Mean | SD |
| Control Group (N=60) | 26.96 | 8.98 | 44.93 | 12.06 |
| Experimental Group (N=60) | 29.85 | 9.46 | 58.40 | 15.47 |

The mean scores of the pre-test on Academic Achievement for the control group is 26.96 and whereas the same for experimental group came out to be 29.85, as both the groups were almost equated on the basis of pre-test Academic Achievement scores and therefore the standard deviation for the two groups were almost same i.e. 8.98 and 9.46 respectively.

The mean scores of the post-test on Academic Achievement for the control group were found to be 44.93 whereas the same for the experimental group came out to be 58.40. The standard deviation for the two groups was 12.06 and 15.47 respectively.

tively. This verifies the first hypothesis that there will be a significant difference in Academic Achievement of Both groups.

Table 2: Summary of ANCOVA on the Mean Academic Achievement Scores of Students in Biology of Experimental and Control Group

| Sources of Variation | df | SS | MSS | F-ratio |
|----------------------|-----|---------|---------|----------|
| Between Treatments | 1 | 2592.79 | 2592.79 | 104.85** |
| Within Treatments | 117 | 2893.25 | 24.73 | |
| Total | 118 | | | |

** $p < 0.01$

It is clear from the table 2 that F-value, testing the significance of difference between mean achievement scores in biology of both the experimental and control groups, came out to be 104.85 which is significant at .01 level. This indicates that constructivist teaching approach given to the experimental group was very useful in producing better performance of students in terms of achievement in biology. Hence, the hypothesis H1, "There is a significant difference in the efficacy of constructivist teaching approach as compared to traditional method of teaching on academic achievement of elementary school students in biology" was accepted.

H2: There is a significant interaction between teaching techniques and intelligence on academic achievement of elementary school students in biology.

Table 3: Mean and SDs of Mean Gain in Achievement Scores in Biology of students of Experimental Group and Control Group at different Intelligence Levels and t-Values

| Levels of Intelligence | Experimental Group | | | Control Group | | | t-values |
|------------------------|--------------------|-------|------|---------------|-------|------|----------|
| | N | Mean | SD | N | Mean | SD | |
| High Intelligence | 19 | 34.79 | 5.31 | 9 | 21.00 | 3.49 | 11.48** |
| Average Intelligence | 31 | 27.58 | 6.07 | 32 | 19.50 | 3.98 | 8.84** |
| Low Intelligence | 10 | 19.70 | 2.97 | 19 | 13.95 | 3.12 | 7.19** |
| Total | 60 | 28.55 | 7.44 | 60 | 17.97 | 4.60 | 12.14** |

** $p < 0.01$

In order to find out the interaction between the teaching techniques (Constructivist teaching approach, traditional method of teaching) and different levels of intelligence, the students of experimental group and control group were divided into three different levels viz. high intelligence, average intelligence and low intelligence levels on the basis of P25 and P75 cut points on intelligence scores. The students scoring above 41 (i.e. >P75) were treated as high intelligence level students and students scoring below 28 (i.e. <P25) were treated as low intelligence level students and the students scoring between 28 and 41 (i.e. >P25 and <P75) were treated as average intelligence level students. The means and standard deviations of subjects of both experimental and control groups in relation to different levels of intelligence are given in the table 3.

It was observed that the mean gain achievement scores in biology of students of experiment group is significantly higher than that of control group (28.55 vs 17.97; $t = 12.14$, $p < 0.01$), which is of low magnitude at low level of intelligence (19.70 vs 13.95; $t = 7.19$, $p < 0.01$), average level of intelligence (27.58 vs 19.50; $t = 8.84$, $p < 0.01$), but of higher magnitude at high intelligence level (34.79 vs 21.00; $t = 11.48$, $p < 0.01$). This shows that significant effect of teaching techniques and significant effect of intelligence are dependent on each other on the gain achievement scores in biology. Hence the hypothesis H2, "There is a significant interaction between teaching techniques and intelligence on academic achievement of elementary school students in biology" was accepted.

Conclusion:

On the basis of results of the study, following conclusions were drawn:

- Elementary School Students taught by Constructivist Teaching Approach exhibit significant higher level of Academic Achievement in Biology as compared to those taught by Traditional Method of Teaching.
- There is a significant interaction between the Teaching Techniques (Constructivist Teaching Approach and Traditional Method of Teaching) and Intelligence on Academic Achievement of Elementary School Students in Biology of experimental group and control group. A significant difference in the mean gain achievement scores in biology of students of experimental and control group was found at different levels of intelligence viz. high, average and low. This is in the direction of the fact that the mean gain achievement scores in biology of students of experimental and control group shows dependency on intelligence.

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